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this has just come to hand from the storm at Bradshaw, Neb. This tornado passed over a tank ten feet long, three feet wide, and twenty inches deep, full of water. This tank was air-tight, and had an opening in the top one foot square. The observer reports that the tornado sucked all the water out of this tank. A moment's reflection will show that this could have been done only by the insertion of the funnel into the opening one foot square. Of course this is absurd, and we must resort to some other explanation of the phenomenon.

11. After the tornado has passed, note the appearance of the houses for explosive effects.

12. Pay particular attention to the direction of the trees, making a separate observation on the south side, in the centre, and on the north side. See if any *débris* or objects have been carried in any case toward the west or south-west on the north side of the track, and measure the distance.

13. A note should be made of the width of the greatest destruction, not including houses unroofed on the borders; also the length of the path where it was most destructive, and the distance from the point at which it first struck the earth to the point at which it left the earth during the time of the greatest destruction.

14. Give the names of persons killed, if any.

15. Give an estimate of the loss to buildings, also specifying the number of buildings destroyed and their characters as to strength, etc.

16. A note should be made of the rainfall,—whether it was most abundant before, during, or after the tornado; also, if possible, the amount of rain at the centre of the track and at some point two thousand or three thousand feet on either side.

17. Careful note should be made of hail, size of stones, width of track, situation with respect to the main track, etc.

18. After the tornado the direction of the path should be most carefully determined.

19. All evidences of corks flying from bottles should be carefully looked for.

20. If one has a barograph, its record will be of the utmost value. If one has a barometer, an observation should be made by some one every minute till the tornado has passed. If the barometer is an aneroid, the face should be gently tapped before each observation. A steady watch of the needle may show any sudden fluctuation too rapid to be caught by reading the barometer. This instrument may be read in a dug-out or a cellar as well as in a house.

Of course, every one will keep eyes and ears open for any and all phenomena to be noted in this remarkable outburst.

H. A. HAZEN.

NOTES AND NEWS.

In *Science* of July 25, second column, 36th line from the bottom, "*cenoreus*" should read "*cinereus*."

—A census taken in St. Petersburg in December, 1889, proved that during the previous twelve months the number of inhabitants had increased by 25,006, and had attained to a total of 1,003,315, says *The Scottish Geographical Magazine*. Attention is drawn to three noteworthy points regarding the population: the first is that the increase is greater in the suburbs than in the heart of the city; in the second place, the ratio of women to men has increased during the last twenty years, probably in consequence of a greater demand for female labor; lastly, since 1885 the births have been more numerous than the deaths, by 2,750 yearly.

—Some discussion has been going on in Ceylon over the question of the language spoken by the Veddahs, the aborigines of that country. The subject, says the *Colonies and India*, would seem to be one well worthy the attention of philologists; and the brothers Sarasin, who have been pursuing their anthropological researches in Ceylon, express the opinion, that, if a philologist were to take the matter up, great service would be rendered to all those engaged in the work of scientific research in the island. Tennant says of the Veddahs (*Nature*, July 17), "Their language, which is limited to a very few words, is a dialect of Singhalese without any admixture from the Sanscrit or Pali,—a circumstance indicative of their repugnance to intercourse with strangers." Professor Schmidt of the Leipzig University, who visited the Veddahs last year, says, "Their language is similar in construction to the Dravidian languages,—that is, similar in grammatical construction,—but they have adopted a great number of Singhalese words," which enabled him to hold converse with them by means of a Singhalese interpreter. The Drs. Sarasin also managed to make themselves understood by means of Singhalese.

—A recent exhibition of electrically deposited copper in London, England, attracted much attention from persons interested in the use of that metal, particularly for steam-pipes and electric conductors. There were shown copper pipes of all sizes, from 6 inches to 18 inches in diameter by about 10 feet in length, and ranging from one-sixteenth to three-eighths of an inch in thickness. They were prepared by an electrical copper-depositing process, on a commercial scale, from common Chili bars without any intermediate process. The bars are placed as the anode in an electrolytic bath, and the tubes are deposited direct on a rotating mandrel, each individual atom of metal being rubbed into those surrounding it by an agate burnisher. The result is a metal having a tensile strength of 25 tons per square inch, with 20 per cent elongation, and of such purity that when drawn into wire it has an electrical conductivity of 104, or 4 per cent better than the standard. This metal is so ductile that it can be drawn down, without any annealing whatever, till it takes forty miles to weigh a pound.

—The Engle garbage-cremator, which has been illustrated and described in these columns, is being successfully introduced in various parts of the country, especially in the South. In Tampa, Fla., one has been constructed of a capacity sufficient to dispose of that city's refuse. An official test, made previous to formal acceptance of the cremator by the authorities, was described in a recent issue of the *Tampa Tribune*. According to that paper, an accurate account kept, showed that in about seven hours' actual running time the furnace destroyed twenty cubic yards of night-soil and garbage, much of the latter being completely saturated with water, and containing large quantities of melons and melon-rinds. The fuel used was light wood, of which about one-quarter of a cord was burned, and three-quarters of a cord of slabs and waste refuse lumber. As nearly as can be stated, the operation of the furnace showed that it would destroy at least forty cubic yards of material in twelve hours, and would require about three-quarters of a cord of light wood during that time. The furnace has been formally accepted and paid for by the city, and will at once be put into active use.

—The council of the Scottish Meteorological Society refer, in a report made July 14, to the observations of Mr. Rankin on the number of dust-particles in the atmosphere, carried on with two sets of apparatus invented by Mr. Aitken. *Nature* states that, though it would be premature to offer a statement of positive results, the council think that some interesting conclusions appear to be indicated by the observations. The maximum number of dust-particles in a cubic centimetre hitherto observed is 12,862, on March 31; and the minimum, 50, on June 15. On March 31, at 4 30 P.M., the summit was clear, and the number of particles was 2,785; but shortly thereafter a thickness was seen approaching from south-west, which by 6 P.M. reached the observatory, and the number of particles rose to 12,862. On June 15 many observations were made during the day, when the number of particles fell from 937 at midnight, to 50 at 10.30 and 11.42 A.M. The observations point to a daily maximum during the afternoon

minimum barometer, and a minimum during the morning minimum barometer, these being probably intimately connected with the diurnal ascending and descending currents of the atmosphere. Interesting intimate relations are also indicated between the numbers of dust-particles and the cyclones and anticyclones over north-western Europe at the time. The observations also indicate that the dust-particles may vary enormously during the presence of mist or fog, without being accompanied by any difference in the apparent density of the fog. The council consider that the inquiry is an extremely hopeful one; and, in view of the relations with cyclones and anticyclones, its bearings as regards the forecasts of the weather will be very specially investigated.

—For several years past it has been the practice of the Indian Meteorological Department to issue in the month of June a forecast of the prospects of the monsoon rains, based partly on the reported extent and thickness of the Himalayan snows, partly on the distribution of the atmospheric pressure, the small variations of which are found by experience to be remarkably persistent in India, and to serve as an indication of the probable strength of the monsoon, and alternately of the prevalence of dry land winds. The forecast for the forthcoming season announces, according to *Nature* of July 17, that owing to the very slight snowfall of Afghanistan, Baluchistan, and almost the whole of the Himalayan region, the conditions are eminently favorable for a good strong monsoon. The only unfavorable indication is that the winter of 1889 has been very severe in Yarkand, and perhaps in other distant parts of central Asia. The pressure is unusually low this year in Bengal, and above the average in central India and the northern half of Bombay; and the local pressure conditions considerably resemble those of 1876. It is therefore considered probable, that while the eastern half of the Ganges valley, Assam, and Burmah will receive early and abundant rain, the rains may be late and scanty over a considerable area of north-western India.

—Recently Mr. S. F. Menage of Minneapolis very liberally agreed to fit out a scientific expedition to the Philippine Islands. Messrs. D. C. Worcester and F. S. Bournes of the University of Michigan were willing to go, and on July 22 they left Minneapolis for Vancouver's Island, *en route* to Manila. They purpose remaining in the Archipelago for at least two years, and during that time they will prosecute the work of zoological and botanical collecting under the most favorable auspices. While specializing upon birds and corals, they will not limit themselves to these, but intend to make collections of *Entomostraca*, fungi, fresh-water *Algæ*, *Mammalia*, and flowering plants. They will give some special attention, moreover, to the land-shells of the islands, many of which present most curious problems of descent and distribution. The large collections which will be made, if no unforeseen accidents occur, are to be worked over under the auspices of the Minnesota Academy of Sciences, and will be deposited in its museums for the use of scientific men. Both Mr. Worcester and Mr. Bournes are experienced zoologists, and Mr. Worcester was for some time instructor of botany in the University of Michigan: so they are well qualified to undertake the study of so diverse and little known a fauna and flora as that of the Philippine Islands. The thanks of American botanists and zoologists are due Mr. S. F. Menage, who so generously endowed the expedition. From its results of real scientific value may be confidently expected.

—That the latitude of a place is not constant has long been suspected; but it was only at the end of last year that systematic observations, carried out at some of the observatories of central Europe, clearly established the fact by eliminating all chances of error in instruments and observers. Professor Helmer reported in No. 2,963 of the *Astronomische Nachrichten* that the latitudes of Berlin and Potsdam, which had shown no perceptible variation during the first six months of 1889, in the third quarter of that year increased at first, and then diminished, the movement continuing till January, 1890. In Berlin and Potsdam this decrease amounted to from five to six inches, and this variation was confirmed by observations at Prague and Strasbourg, the results at the first three observatories agreeing to within one-tenth of a second. According to *The Scottish Geographical Magazine*, the subject is to be discussed at the meeting of the Commission for In-

ternational Geodesy, to be held in Freiburg next September, when, it is to be hoped, arrangements will be made for a strict examination of this phenomenon.

—The population of Iceland has for several years been decreasing, owing to the strong tide of emigration to America. It is stated in *The Scottish Geographical Magazine* that the population in 1888 was 69,224, whereas in the preceding year it amounted to 69,641, and in 1885 to 71,613. This phenomenon is most marked in the northern and eastern parts of the island. The growth of the population of Reykjavik, the capital, from 3,460 in 1885 to 3,599 in 1888, shows that the tendency of population to concentration in towns prevails also in Iceland.

—Many of the workmen who were employed in the caissons of the East River, Forth, and other bridges, suffered severely from the effects of working in an atmosphere of compressed air, as do those now employed in the tunnel under the Hudson River. During the construction of the Forth Bridge piers, it was noticed that the sufferers were in the habit of spending their Sundays and Saturday half-holidays in the air-chamber, thereby finding relief from their pain. Acting on the idea suggested by this fact, Mr. Moir, the engineer in charge of the Hudson River Tunnel, has had constructed a compressed-air hospital for the men employed in the tunnel, among whom there have been several severe cases of "bends," although the air-pressure is not particularly high; never, indeed, exceeding thirty pounds per square inch. The hospital, as described in *Engineering*, is a cylinder 18 feet long by 6 feet in diameter, constructed of steel plates three-eighths of an inch and half an inch thick, and divided into two chambers by a transverse bulkhead. One of these chambers acts as an air-lock for the other, and both are fitted up with beds and every thing necessary for the comfort of the patients. The air-pressure is maintained by a pump, a constant supply of fresh air being secured by keeping a pet-cock in the shell of the hospital open, through which the air continually leaks out. A safety-valve is also supplied to prevent over-pressure, should the pumps run away.

—A long article by Dr. von Danckelman, containing details concerning the atmospheric phenomena of the Guinea coast, is thus summed up in *The Scottish Geographical Magazine* for July: "These depend in the main on the atmospheric pressure over the lands of North Africa, and especially the Sahara, where the mean temperature in summer rises above 98° F. The low pressure thus produced draws in the air from all sides to restore equilibrium. Hence the prevalent winds on the Guinea coast during this season are the south and south-west; while in winter the contrary phenomenon occurs, except sometimes on the shore, where the higher temperature of the land maintains a continuance of southerly breezes. The highest pressure occurs in July and August, and the lowest in February and March. The range of the monthly mean is small, amounting only to from .14 to .18 of an inch. As regards temperature, it is found that the maximum occurs in February and April, and the minimum in July or August. The mean daily range is nearly twice as great in the hottest season as in the coldest, and increases considerably towards the interior. In Bismarckburg the mean maximum (in March) was 87.7° F., and the minimum (in July and August) 65.3°, and the maximum and minimum ranges 23.6° and 13.8° respectively. At Akassa the average daily range is only 10°, while at Bismarckburg it is 18.5°. Turning now to the rainfall, it appears that a rainy season of four months sets in shortly before the sun reaches the zenith, which it does in the beginning of April, and that the maximum fall occurs in May and June. About the latter part of June, the dry season commences, and lasts till the middle, and sometimes the end, of September. The yearly rainfall at Bismarckburg is over 59 inches; at Accra, 29; at Christiansborg, 22.6. Half the storms come from directions lying between north-east and south-east, most of them from the north-east. Tornadoes are most frequent before the commencement of the rainy season. The most singular phenomenon on this coast is the *Harmattan*, a dry wind, laden with dust, and often bringing with it hazy and cloudy weather. On the Senegal it follows an east to east-south-easterly direction; on the Gold Coast and near the mouth of the Niger, a more northerly course; and it blows most frequently in December and February."